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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/587,345	07/25/2006	Christopher Bilson	4933/PCT	6639
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EXAMINER				
WIEHE, NATHANIEL EDWARD				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/587,345

Applicant(s)

BILSON ET AL.

Examiner

NATHANIEL WIEHE

Art Unit

3745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-19, 24-27 and 32-36 is/are rejected.
- 7) ☒ Claim(s) 20-23, 28-31 and 37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

Initially, the examiner apologizes for inadvertently leaving U.S. Pat. No. 3,887,147 off of the Notice of References Cited. The reference is cited on a new PTO-892 submitted herewith.

The amendment to claims 17 and 32 has overcome the previous rejection under § 112.

Applicant's arguments, see pg. 17, filed 6 July 2009, with respect to the rejection(s) of claim(s) 17-19,21 and 22 under 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is being made. Applicant's general argument is that no combination of the prior art references teaches the specific type of sensor, located in the stator vane, and arranged at the specific location of a twin or tri spool turbine. However, Junggren teaches a sensor positioned in the vane and Mulera et al. discloses the specific type of impact sensor. Further, the use of twin or tri spool turbines is well known in the art and the sensor location of Junggren is equally applicable to the first vane of the second stage or any other vane downstream of a turbine rotor. Therefore, the particular arrangement as claimed would have been obvious from the prior art, as articulated below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17-19,24-27 and 32-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grieb (3,887,147) in view of Junggren (1,326,867) and Mulera et al. (6,607,349), hereinafter "Mulera". Grieb discloses a gas turbine engine, particularly for an aircraft engine including two compressors (2,3) a combustion chamber (5) and three turbines; a high pressure turbine (6), a medium or intermediary turbine (7) and a low pressure turbine (8). Or more simply, Grieb discloses a three-spool aircraft engine. Each of the turbines inherently include both stator vanes and rotor blades in an alternating relationship. However, Grieb does not disclose the use of an arrangement for detecting a shaft break. Junggren discloses an arrangement for detecting a shaft break, i.e. wheel loosening on the shaft (Junggren page 1, line 16-22), in an elastic-fluid turbine, i.e. gas turbine. The device includes a radially inwardly positioned operator element (25) with a sensor element (22) guided in the stator (16) of a turbine stage. The emergency condition is detected by the operator element (25) and converted to an electrical signal that is transmitted to a switching element (8) positioned radially outward of the flow channel of the turbine and on the housing of the turbine (See Fig. 3). The operator element is positioned downstream of the turbine to be sensed on the first stator vane of the adjacent rotor. The sensor element (22) or wire is guided radially within the stator vane (16) and is thereby withdrawable therethrough. Junggren's device allows for the signaling and automatic shutdown of a turbine under conditions likely to cause damage (Junggren page 1, lines 16-22). Further, the radially inward end of the sensor

element (22) cooperates with the operator element (16) such that the operator element (16), in response to a shaft break, is moved onto and hits the sensor element resulting in the production of the electrical signal. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the three-spool aircraft engine of Grieb by utilizing an arrangement for detecting shaft breakage as taught by Junggren for the purpose of signaling or automatically shutting down the turbine under conditions likely to cause damage to the turbine. Further, Junggren notes that the turbine may include any number of stages and the sensing device may be placed in any desirable location (Junggren 95-105). One of ordinary skill in the art would readily recognize such a desirable location as being in between the various turbine stages, thereby allowing for identification of which particular shaft has been damaged. Additionally, in *KSR*, the court recognizes numerous exemplary rationales for supporting a conclusion of obviousness including "Obvious to try" –choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success. *KSR* 82 USPQ2d at 1396 & MPEP 2141(III). In the instant case, the finite number of solutions would be locating the sensor in each of the guide vanes in the turbine each of which would be reasonably expected to detect the breakage of the rotor that was upstream of the respective guide vane.

Also, the modified invention of Grieb discloses the invention substantially as claimed except for the use of an impact type sensor. However, Mulera discloses a device for detecting the breakage of a turbine shaft that includes an impact type sensor. That is that the sensor includes an operative element (30) that is driven into and breaks

or changes the structure of the sensor element, i.e. link (24), thereby creating the electronic signal indicating the shaft break. Further, the operative element (30) is linearly slidable and responds to the breakage of the turbine shaft by slidingly linearly into the link thus creating an electrical signal in response to said linear sliding. Both Mulera and Junggren are related as emergency condition detecting devices in use in gas turbine. The only lacking component of Junggren is the use of the particular sensor type that is known in the art to be utilized for the same function, as evidenced by Mulera. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify the turbine of Grieb by substituting the wear-away sensor of Junggren for an impact-type sensor as taught by Mulera since such a modification would be a simple substitution of parts yielding predictable results, i.e. generation of an electronic signal.

Allowable Subject Matter

Claims 20-23,28-31 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The instant invention is a non-obvious improvement in the art of multi-spool turbine shaft break detection devices.

Regarding claims 20,23,28 and 31, the improvement comprises the use of a break detector including a linearly slidable operating element that is fixed in the axial

direction by a shearable pin. The use of such a pin in an impact type sensor is not known in the art of multi-spool turbines.

Regarding claims 21,22,29,30 and 37, the improvement comprises the use of a sensor element that is guided radially in the stator and withdrawable out of the stator in the radial direction that cooperates with a linearly slidable operator element. The use of this particular arrangement of an impact type sensor is not known in the art of multi-spool turbines.

Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The patent issued to Moniz et al. discloses a turbine including sensor elements located in the sealing structures of guide vanes.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHANIEL WIEHE whose telephone number is (571)272-8648. The examiner can normally be reached on Mon.-Thur. and alternate Fri., 7am-4:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Look can be reached on (571)272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NATHAN WIEHE/
Nathan Wiehe
Examiner
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/Edward K. Look/
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